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WO 93/20654 A1 US 5412482 A US 5299006 A
US 5103297 A US 5027211 A US 4639765 A
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(54) **Video switch with reduced crosstalk**

(57) Crosstalk between adjacent input terminals 13a, 13b of a CMOS SPDT switch 13 is reduced by connecting a fixed potential U0 to the main input 13b when a second, floating, input 13a is selected. The fixed potential is connected by switch 12, which is operated concurrently with switch 13 by controller 19. Switch 11 selects between a main video signal 14 and an on-screen-display (OSD) signal 17. The OSD and main video signals are clamped by a diode circuit 15. The circuit may be used in a TV receiver or a video cassette recorder.

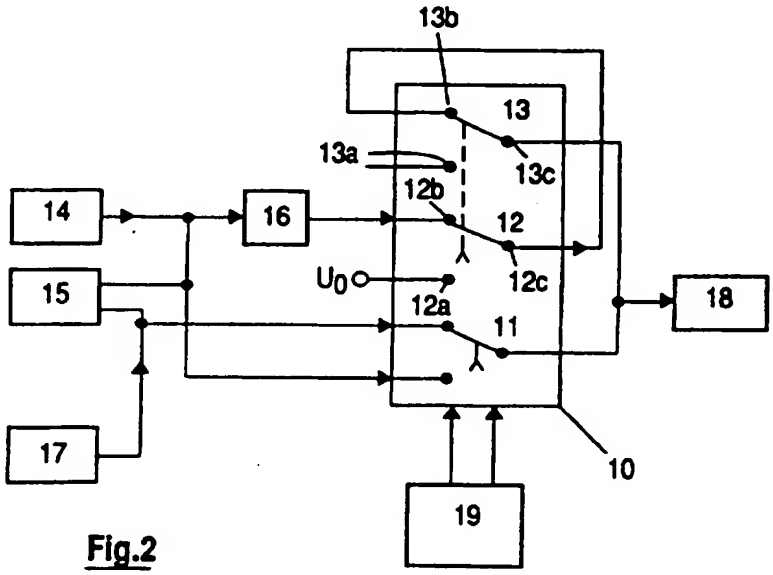

Fig.2

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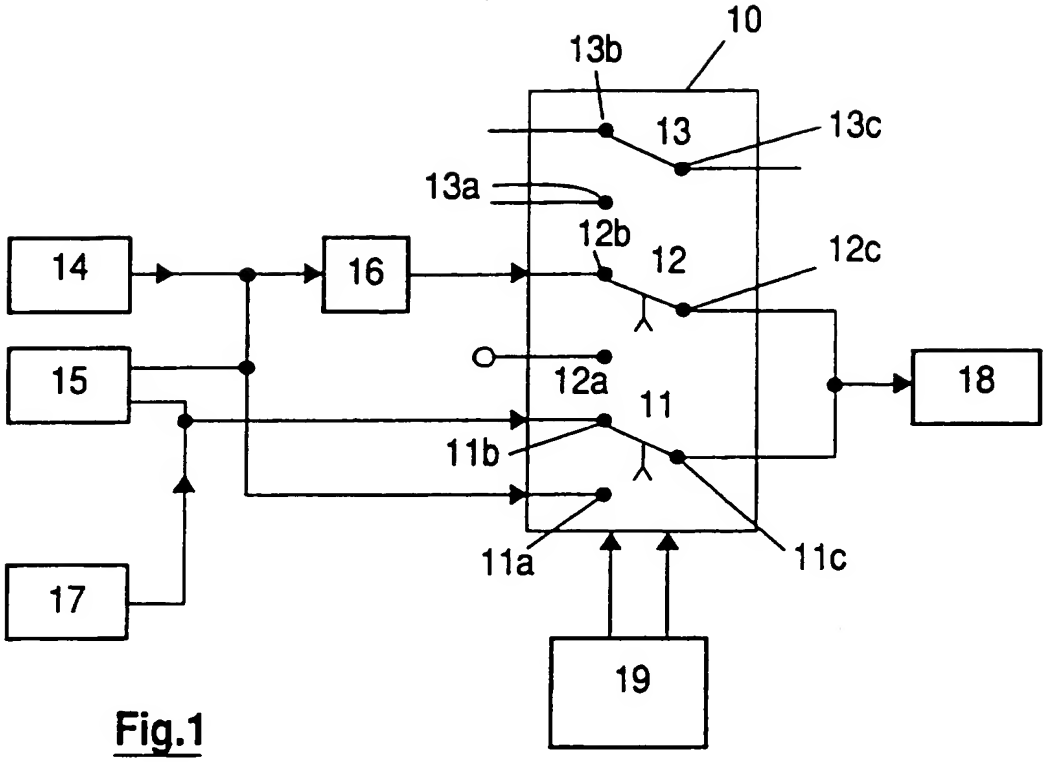

Fig.1

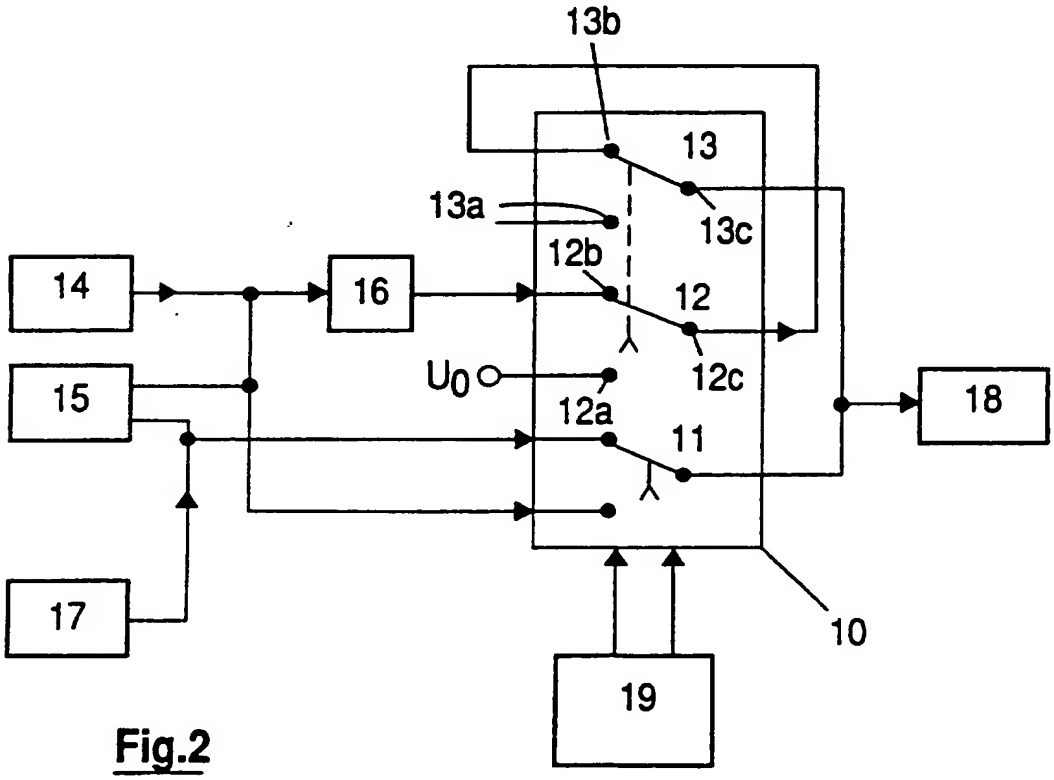

Fig.2

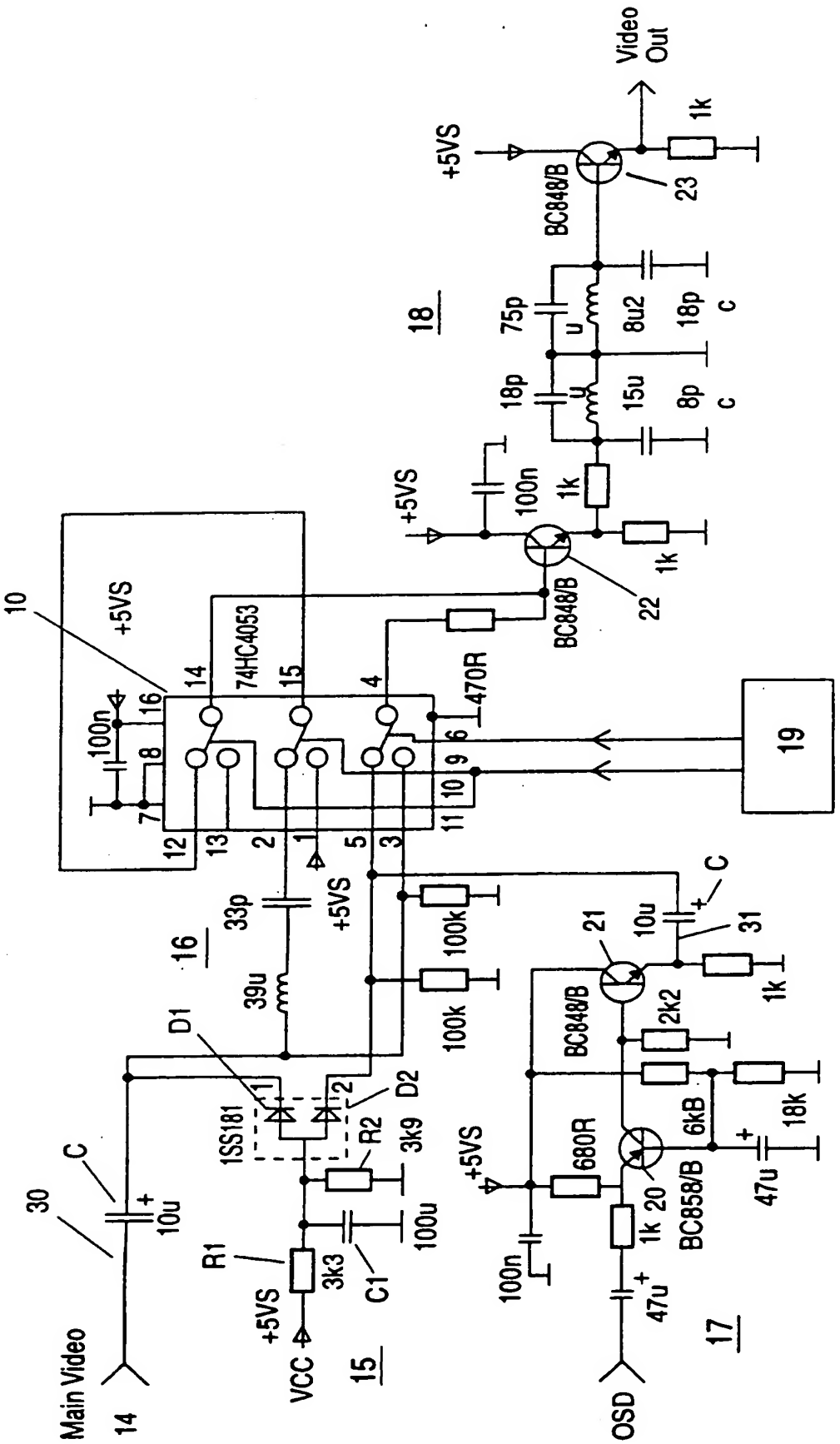

Fig.3

Switch Circuitry

The present invention relates to a circuitry of a switch according to the generic part of claim1.

It is generally known to realise flexible connections between different electrical lines with the aid of a switch. Such a switch has at least one input terminal and at least one output terminal and it can be a closing switch or a mutiple-way switch. In the further description, a terminal which is connected to a path which provides electrical signals is called input terminal and a terminal which is connected to a path which receives said signals is called output terminal. So, the definition of input terminal and output terminal depends on the function which is realised by the switch. In practice the terminals of a switch are interchangeable, so that input terminals can be output terminals and vice versa. The connection between the input and the output terminals can be performed by any controllable conducting means, like a pivoted piece of metal or any electronical means, like a transistor.

It is also known to use standard switch devices, which are availabale on the market. Such a device is e.g. the switch 74HC4053, which is a switch device including three single switches, each having two input terminals and one output terminal.

In some applications it happens that some of the switches with two input terminals is used just as closing switch. That means that for performing a connection (connection mode), a first input terminal, fixed connected to a signal path, is connected by the switch to an output terminal. For performing a disconnection (disconnection mode), a second input terminal, which is not fixed connected to any path, is connected by switching to the output terminal. Due to the compact design cross-talk may occur during the disconnection mode, as the second input terminal is influenced by the signal present at the first input terminal.

The same effect may occur when only one input terminal, but two output terminals are provided.

So, it is the object of the present invention to reduce or even avoid cross-talk, which may occur when a switch having more than one input terminal or having more than one output terminal is used as closing switch.

This object is solved by the matter of claim 1. Advatageous embodiments are given by the subclaims.

According to the switch circuitry of this invention, the second input or output terminal, which is not connected to a signal path, neither in the connection mode nor in the disconnection mode, is fixed connected to a reference voltage. This reference voltage may be e.g. a supply voltage or ground.

It was found that in case that the second terminal is used as input terminal, further stages connected to the first output terminal, may not work accurately. This means that in the disconnection-mode an open connection to said further stages must be realised, but also reducing or avoiding the above mentioned cross-talk.

This is solved by using two switches. A first input terminal of a first switch is connected to a signal path and a second input terminal is connected to said reference voltage. An output terminal of this first switch is connected to a first input terminal of a second switch, which is controlled essentially concurrently with the first switch. A second input terminal of this second switch is open, which means disconnected. The further stages are connected to an output terminal of the second switch.

This solution is based on the principle that connection pins of input terminals of the same switch are very close to each other which results in the fact that a signal path connected to the first input terminal may also influence the second input terminal.

In a preferred embodiment the switch is used for switching different video signals, e.g. inside a TV-set a video cassette recorder (VCR) or thelike. A first video signal is the main video signal and a second video signal includes information for an on-screen-display (OSD).

Known OSD mixers encounter the problem that when an OSD information and a video picture are displayed on a single screen, it cannot always be ensured, that both signals are displayed with the same brightness, which can be unconvenient for an observer. Such a common brightness can be realized if the OSD signal and the video signal are forced to have the same DC voltage value.

To solve this problem, it is also proposed to use a clamping circuit, which comprises a circuit, which clamps both signals to a common predetermined reference DC voltage.

The clamping circuit can comprise a voltage divider consisting of a pair of resistors, a capacitor and two diodes.

Further details and advantages of the invention will now be described with the aid of following preferred embodiments with reference to the accompanying drawing, wherein

Fig. 1 shows a block diagram of a first embodiment of the invention;
Fig. 2 shows a block diagram of a second embodiment, where the output terminal of a first switch is connected to an input terminal of a second switch;
Fig. 3 shows a circuit diagram of a third embodiment.

Fig. 1 shows a switch device 10, which is preferably realised as a CMOS analog switch, e.g. 74HC4053, and which includes 3 single switches 11, 12, 13. Each of the switches 11, 12, 13 has two input terminals and one output terminal. The first input terminal 11a of switch 11 is connected to the output of a main video source 14, to a first input of a clamping circuit 15 and to the input of a SECAM/MESECAM colour band pass filter 16. The second input terminal 11b is connected to an OSD video source 17, which is also connected to a second input of the clamping circuit 15.

The first input terminal 12a of switch 12 is open.

The output terminals 11c, 12c are both connected to a block 18, which indicate further stages, which process and display the switched video signals. The switch device is controlled by control means 19, which may include a microprocessor or thelike and which control switches 11 and 12 separately. Switch 13 is not connected in this embodiment.

The control means 19 control switch 12 such that 12b is connected with terminal 12c when SECAM/MESECAM signals are to be processed. SECAM/MESECAM signals are in range of about 4.4 MHz and are passed through the band pass filter 16. As this is well known by persons skilled in the art, it may be avoided to explain this in more detail.

Further, control means 19 control switch 11 such that terminals 11a and 11c are connected when OSD video signals are to be processed by the stages 18. When main video signals are to be processed, terminals 11b and 11c are connected.

Due to the opened end of terminal 12a, cross-talk/interferences from the colour (PAL, SECAM OR MESECAM) signals, present at terminal 12b, to terminal 12a cannot be avoided.

So, according to a further embodiment (not shown), the terminal 12a is connected to a reference voltage Uo, which is preferably 5 volt, but which may have also any other voltage, including ground. As this may have the disadvantage, that in those modes, where terminal 12a is connected with terminal 12c, the input of stages 18 are connected to Uo and are not open.

To solve this problem, the further embodiments are proposed.

Fig. 2 shows another embodiment, which differs mainly from the above described embodiment by the fact that the output terminal 12c is connected to the second input terminal 13b of switch 13.

The first input terminal 12a of switch 12 is connected to a reference voltage Uo, which is preferably +5 volt, but which may have also any other voltage, including ground. The second input terminal 12b of switch 12 is connected to the output of band-pass filter 16.

Switches 12, 13 are controlled by a common control signal from the control means 19. In the shown connection mode, the colour signal through the band pass filter 16 is connected via terminals 12c, 13b, 13c to the stages 18. Terminal 13a is open or disconnected. When SECAM/MESECAM signals are not to be processed (disconnection mode), terminal 12a, 12c and 13b are connected together to Uo and terminal 13a and 13c are connected with each other. This results in the fact that stages 18 have an open input-connection in that mode.

Due to the fact that the terminals 12b and 13a, which represent the signal source and open input lead to stage 18 respectively, are not close to each other and in addition, cross-talk from terminals 12b (signal source) to 12a are grounded (ac). Therefore a cross-talk can be reduced or even avoided.

Fig. 3 shows a circuit diagram of an embodiment which is comparable to the one of Fig. 2.

In the following description, preferred values of used components are given in brackets. It may be emphasized that the invention is not restricted to components with the preferred values.

The stage 17 includes a pnp-transistor 20 (BC858/B) and a npn-transistor 21 (BC848/B). The components around these transistors are accordingly adapted.

The stage 18 includes two npn-transistors 22, 23 (BC848/B) and accordingly adapted components.

Now the clamping circuit 15 is described in more detail.

In both video signal line 30 and OSD signal line 31, a capacitor C (10 µF) is provided before the clamping circuit 15 clamps both lines 30, 31 to a common DC level. The clamping circuit 15 is realized by a voltage divider consisting of resistors R1 (3.3 kOhm), R2 (3.9 kOhm), wherein R2 is connected to ground and R1 is connected to a supply voltage Vcc (+ 5 V), a capacitor C1 (100 µF), and two diodes D1, D2 (1SS181).

A further, not shown embodiment, uses a switch, comparable to the switch 12 such, that terminal 12c is used as input terminal and connected to filter 16 and that terminal 12b is used as a first output terminal, connected to stages 18. In that case terminal 12a is connected to the reference voltage Uo. Thereby cross-talk can also be reduced during the disconnection state.

CLAIMS

1. Switch circuitry including a first switch (12) having a first input terminal (12b) and a second input terminal (12a) and also having an output terminal (12c) leading signals for processing means (18) in dependence on a switch state, where said first input terminal (12b) is connected to a path conducting signals to be processed by said processing means (18), characterized in that
said second input terminal (12a) is connected to a reference voltage (Uo) or open.

2. Switch circuitry according to claim1, characterized in that a second switch (13) is provided having a first input terminal (13b) and a second input terminal (13a) and also having an output terminal (13c) connected to said processing means (18), where said first switch (12) and said second switch (13) are controlled essentially concurrently and where said output terminal (12c) of said first switch (11) is connected to said first input terminal (13b) of said second switch (13) and where said second input terminal (13a) of said second switch is not connected.

3. Switch circuitry including a third switch having one input terminal connected to a signal source (14) providing signals to be processed and having a first output terminal, which is connected to processing means (18) and a second output terminal, characterized in that
said second output terminal is connected to a reference voltage (Uo).

4. Switch circuitry according to any of the preceding claims, characterized in that said signals to be processed are first video signals derived from a first video signal source (14).

5. Switch circuitry according to claim 4, characterized in that said first video signals and second video signals from a second video source (17) are DC-adapted by a clamping circuit (15).

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report) 8	Application number GB 9522944.9
Relevant Technical Fields (i) UK Cl (Ed.O) H3P (PDN, PCCA, PCCX), H4F (FBA, FBB) (ii) Int Cl (Ed.6) H03K (17/16), H04N (5/262, 5/268, 7/087, 7/088) (17/00, 17/62, 17/693)	Search Examiner MR K SYLVAN Date of completion of Search 14 FEBRUARY 1996
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii)	Documents considered relevant following a search in respect of Claims :- 1-5

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&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	WO 93/20654 A1	(HOFMAN-BANG) see Figure 4	1, 4
X	US 5299006	(KIM) see Figure 2	1, 4
X	US 5103297	(MATSUSHITA) see Figure 1	1, 4
X	US 5027211	(ROBERTSON) see Figure 3	1, 4
X	US 4639765	(T.I) see figure 4	1, 4
X	US 4319278	(UNIVERSAL PIONEER) see the Figures	1, 4
X	US 5412482	(ROHM) see Figure 3	1, 4

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